Introduction to Coastal Modeling Using the Surface-water Modeling System

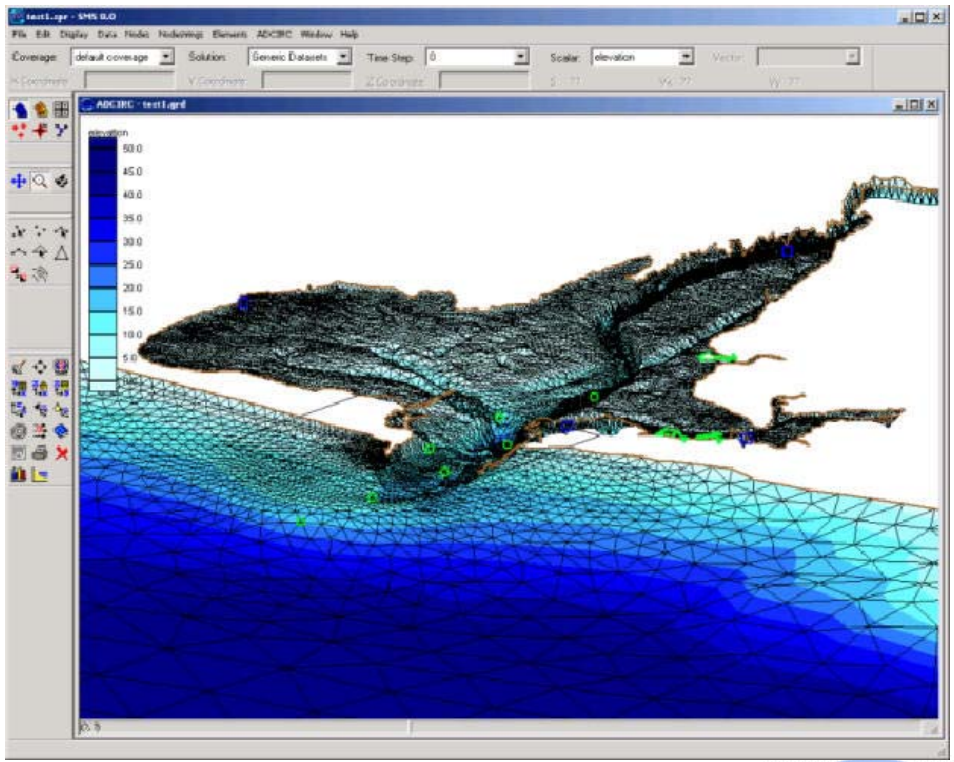
ADCIRC
STWAVE
M2D
CGWAVE

Software Used In this Course

- Circulation
  - ADCIRC
  - M2D
- Wave Climate
  - STWAVE
  - CGWAVE
- Pre- & Post-Processing
  - SMS

ADCIRC

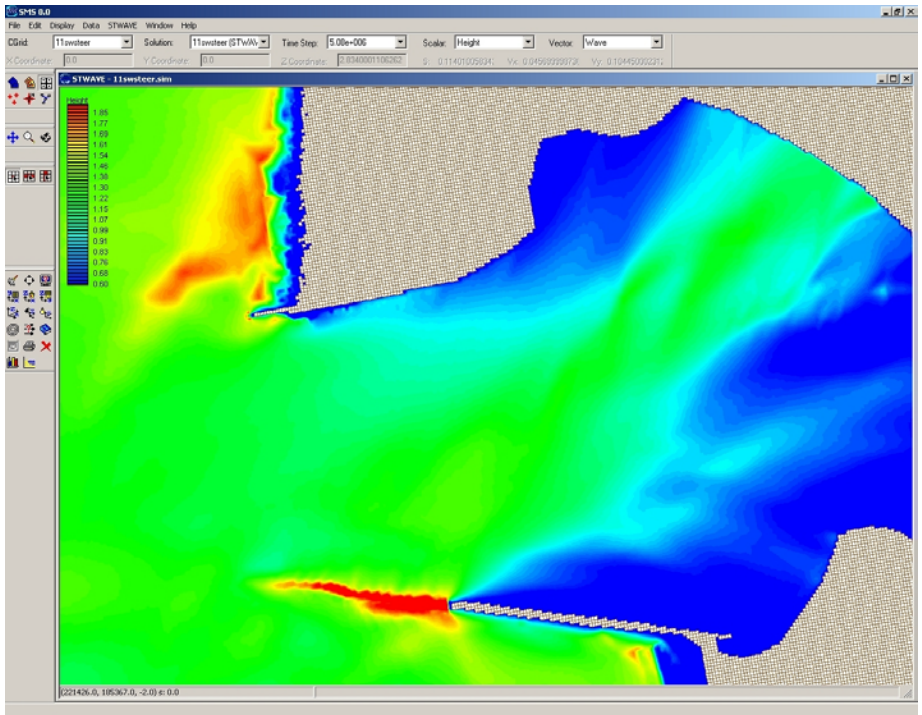
- Multiple boundary conditions
- Tidal forcing
- Wind forcing
- Wave forcing
- Harmonic Analysis
- Finite Element Mesh/Grid
- Wetting & drying



3D fiew of Grays Harbor Grid

STWAVE

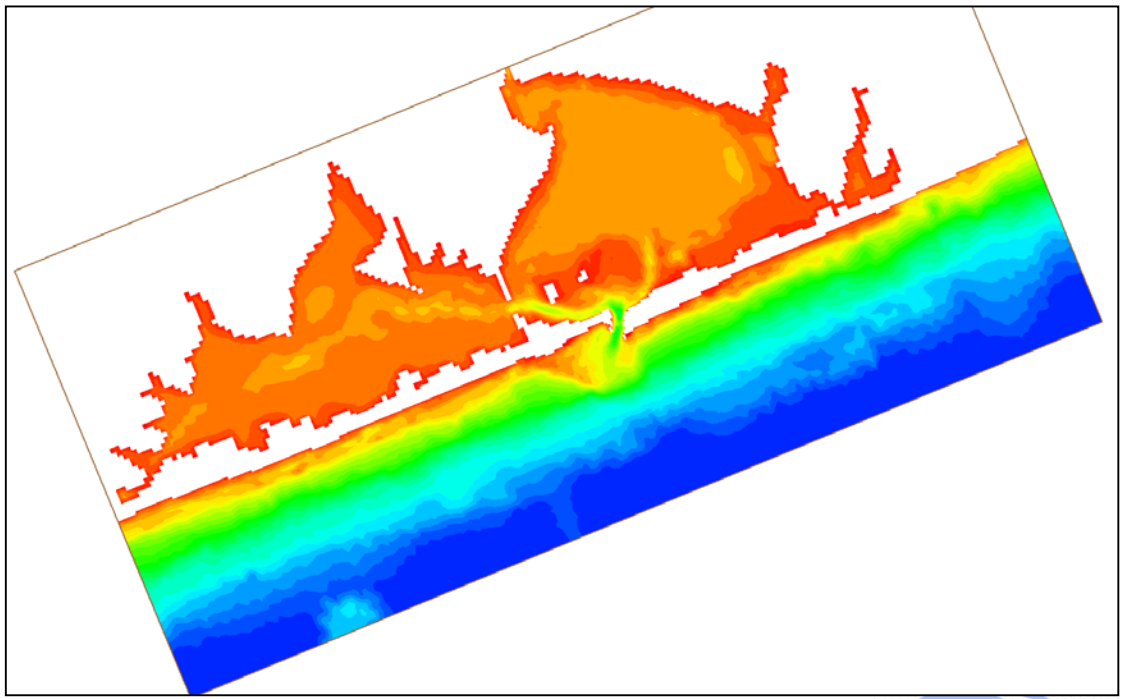
- Spectral Wave
- Wind forcing
- Current forcing



STWAVE computed wave Heights

M2D

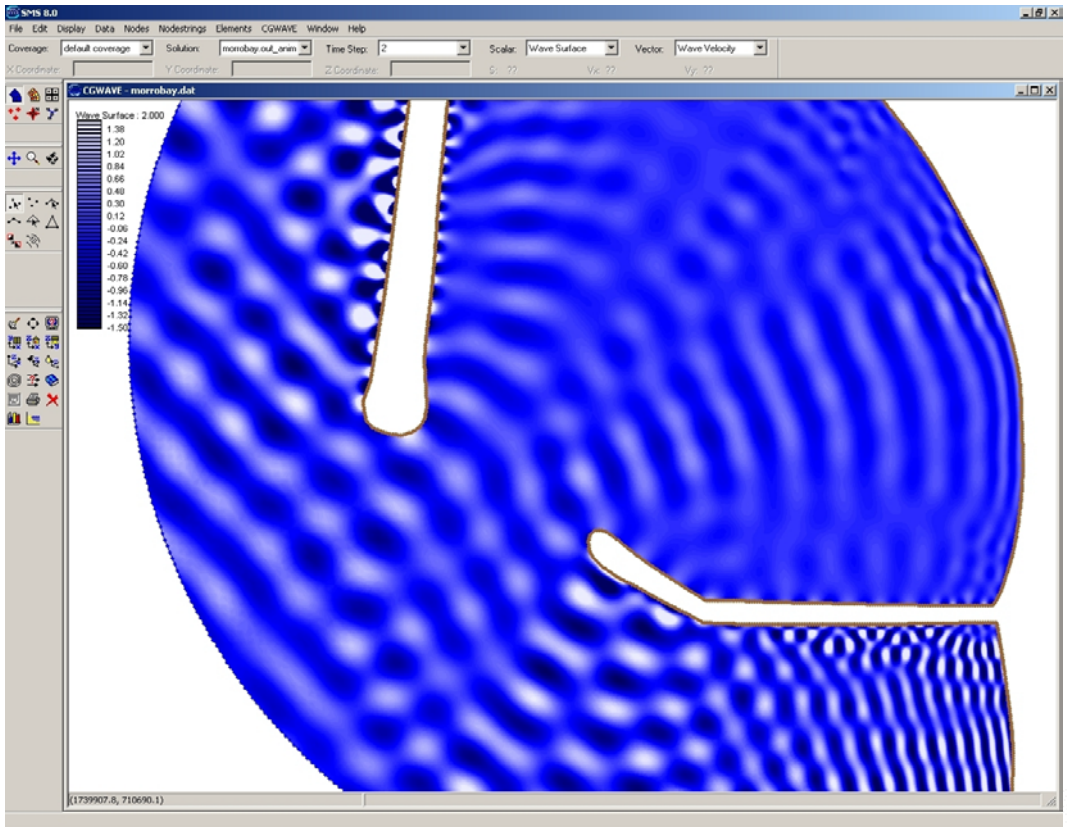
- Multiple types of boundary conditions
- Wind forcing
- Wave forcing
- Variable cell size
- Wetting & drying
- Spatially - variable friction coefficient



M2D domain for Shinnecock Inlet, NY

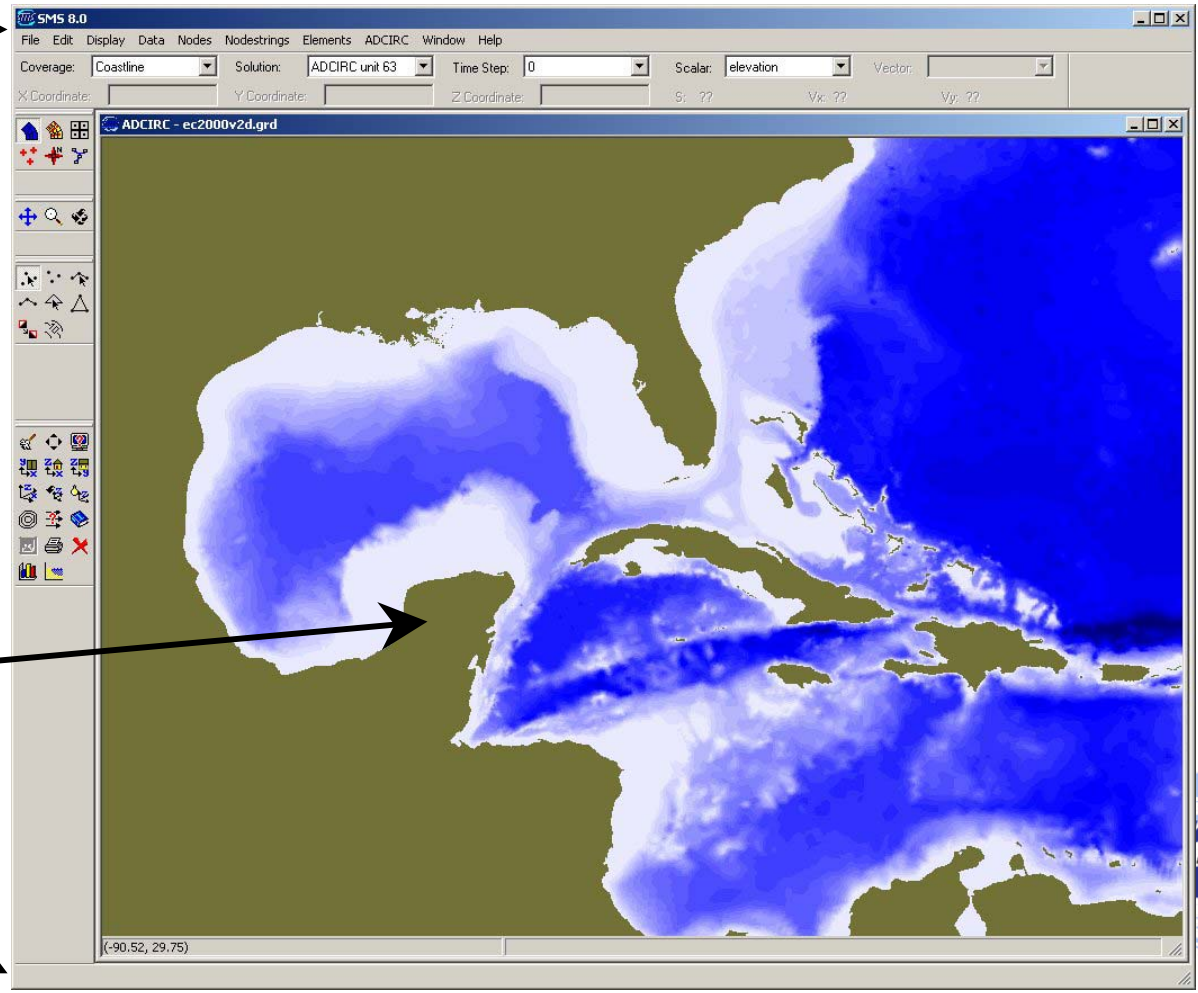
CGWAVE

- Reflection
- Refraction
- Finite Element mesh
- Spectral sea state



CGWAVE Sea state for Morrow Bay

What is SMS

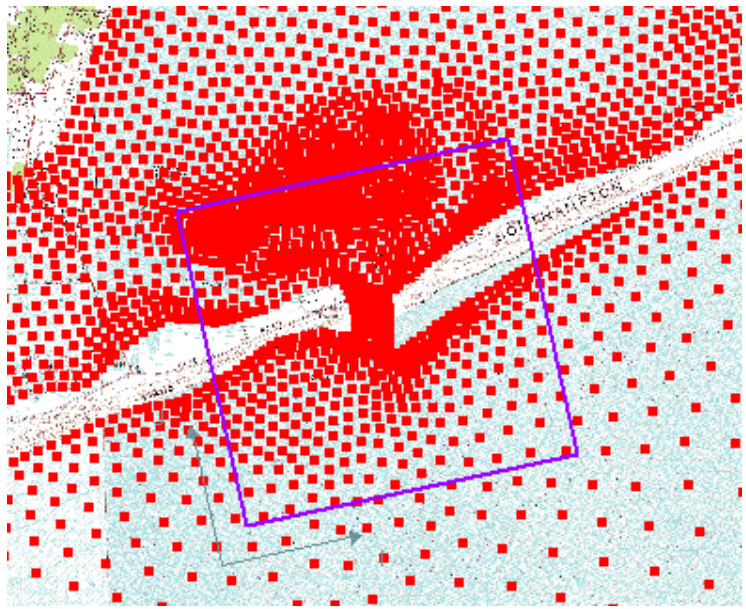

Edit
Toolbar
Display
Help/Status
SMS 8.0
File Edit Display Data Nodes Nodestrings Elements ADCIRC Window Help
Coverage: Coastline
Solution: ADCIRC unit 63
Time Step: 0
Scalar: elevation
Vector:
X Coordinate:
Y Coordinate:
Z Coordinate:
S: ??
Vx: ??
Vy: ??
ADCIRC - ec2000v2d.grd
(-90.52, 29.75)

Tools and Macros

- Tools
  - Controls effects of mouse activity in graphics window
  - Arrow in icon indicates “select” tool
  - Dependent on current module and model
- Macros
  - Menu command equivalents
  - Available at all times

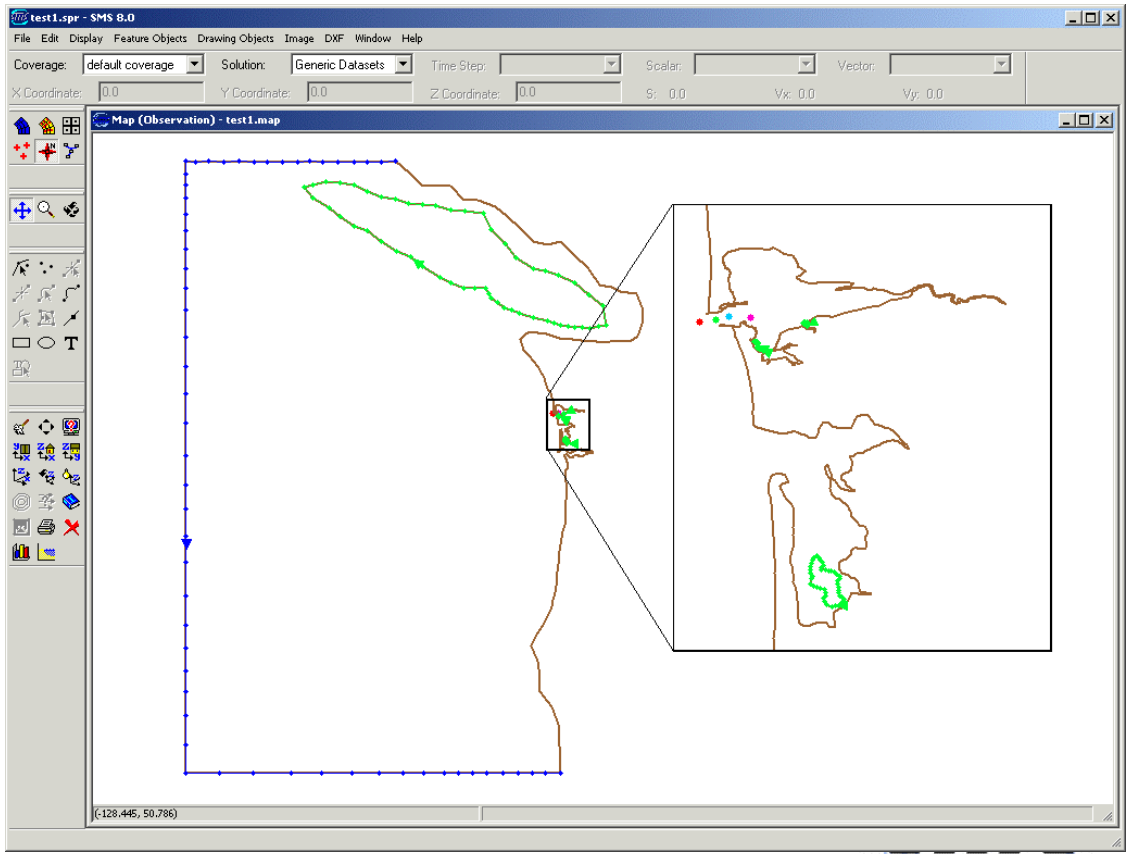
The Scatter Module

- Stores spatially varied data (Bathymetric data most common)
- Interpolates Data to Model grids
- Where Does it Come From?



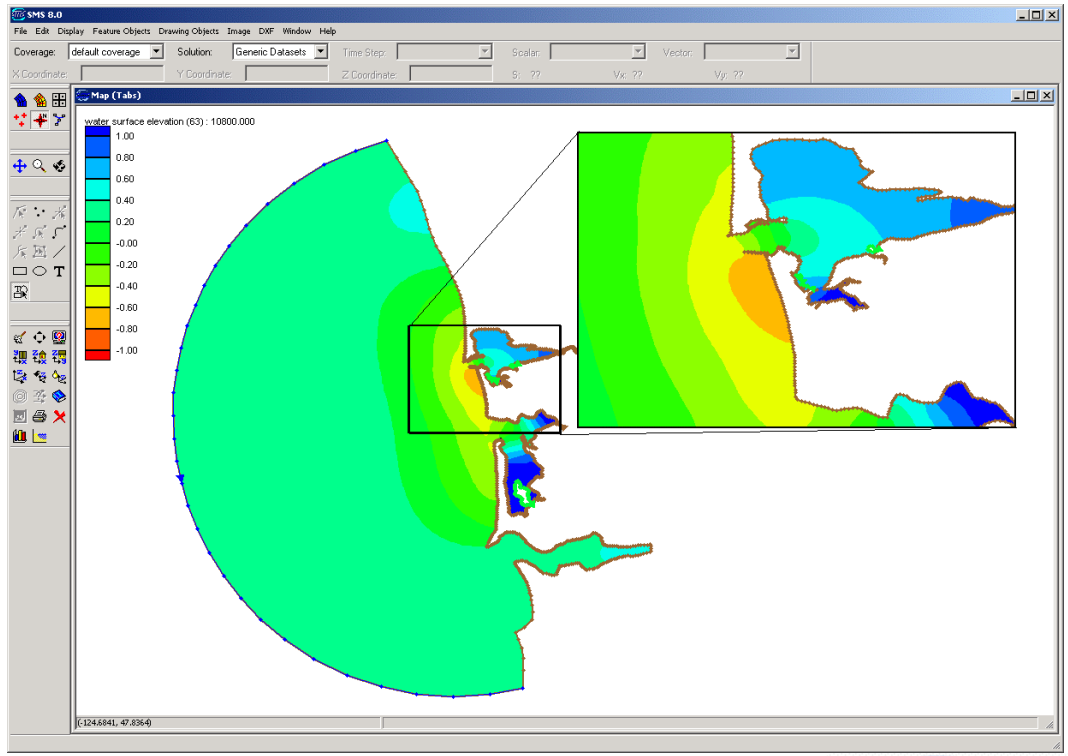
The Map Module

- Stores domain extents
- Defines features
  - point/ locations
  - shapes
  - areas
- Defines attributes
  - stations
  - boundary conditions
  - materials



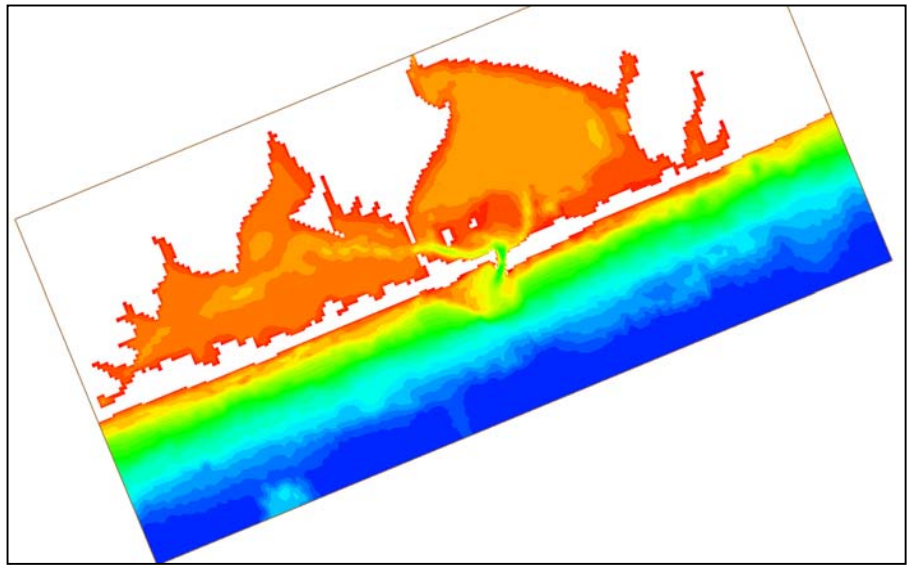
The Mesh Module

- Stores Finite Element Mesh
- Allows graphical interaction
  - Mesh Editing
  - Boundary Conditions
  - Model Parameters
  - Materials
- Visualization
  - Numerical Model Layout
  - Solution Data



The Cartesian Grid Module

- Manage Finite Difference Grids
- Allows graphical interaction
  - Grid Editing
  - Boundary Conditions
  - Model Parameters
  - Materials
- Visualization
  - Numerical Model Layout
  - Solution Data

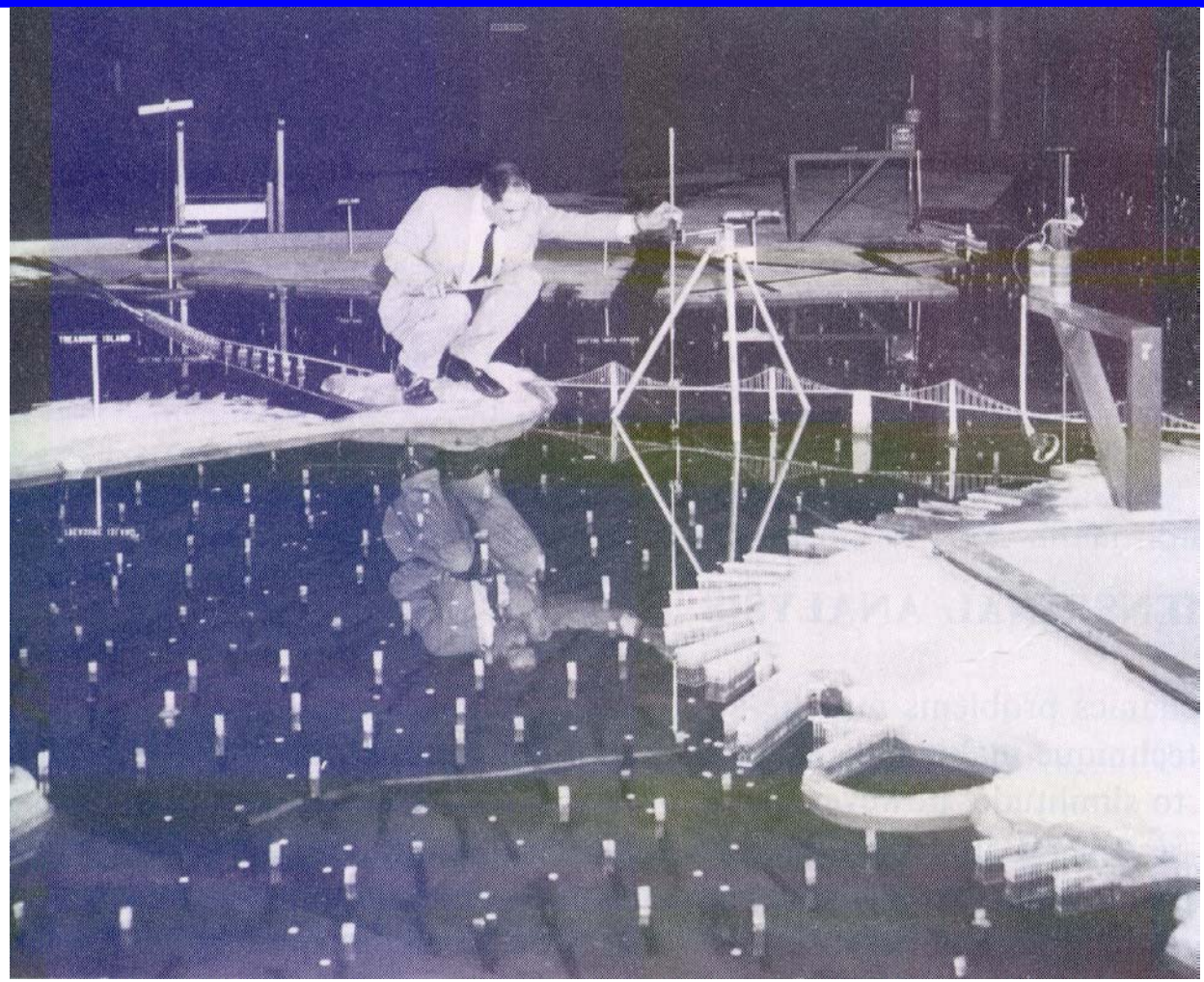


Choosing a Model

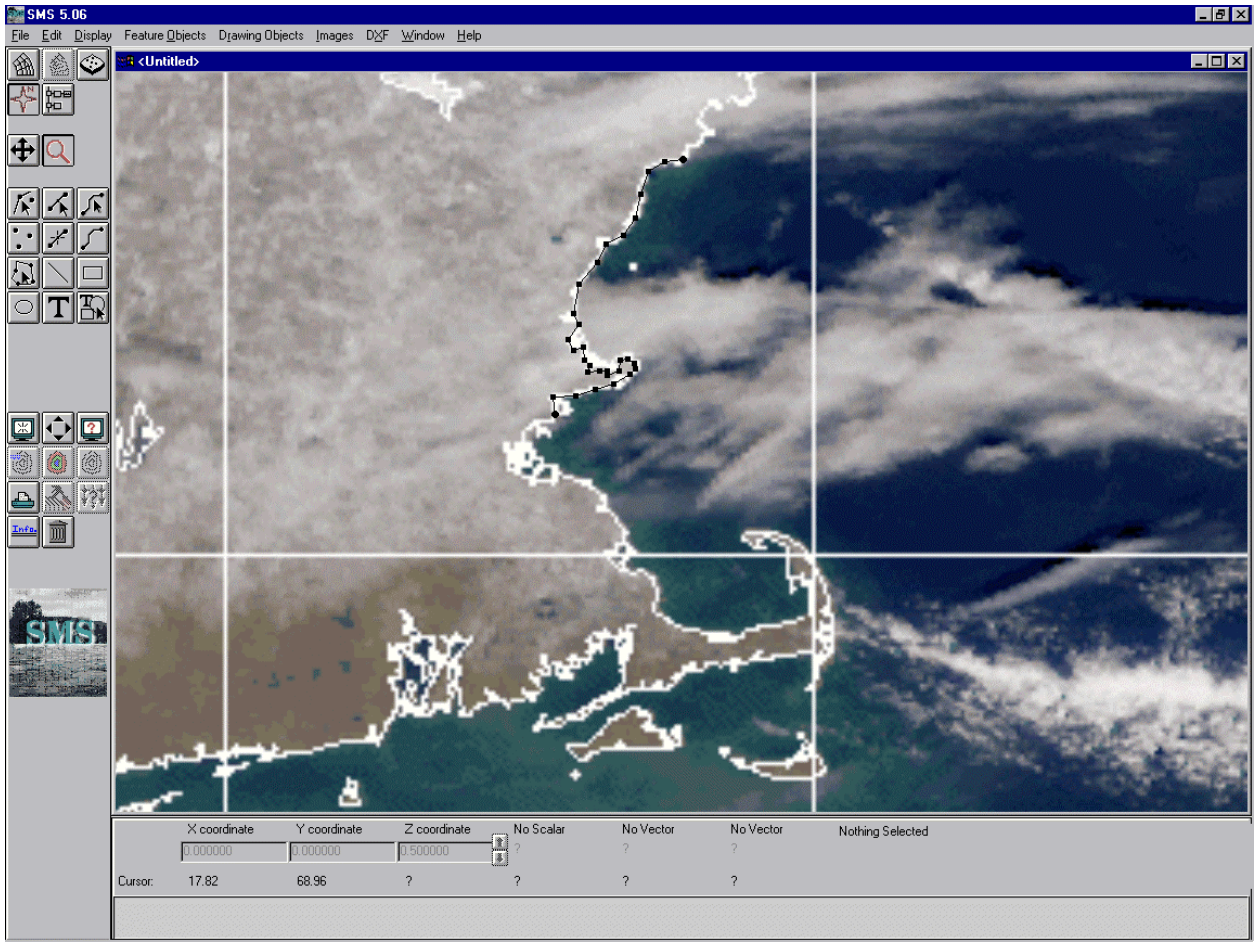
Which Model to Use?

- What are you trying to decide
- What type of data do you have
- How much time do you have
- How important is the result
- Analytical, Numerical, Physical

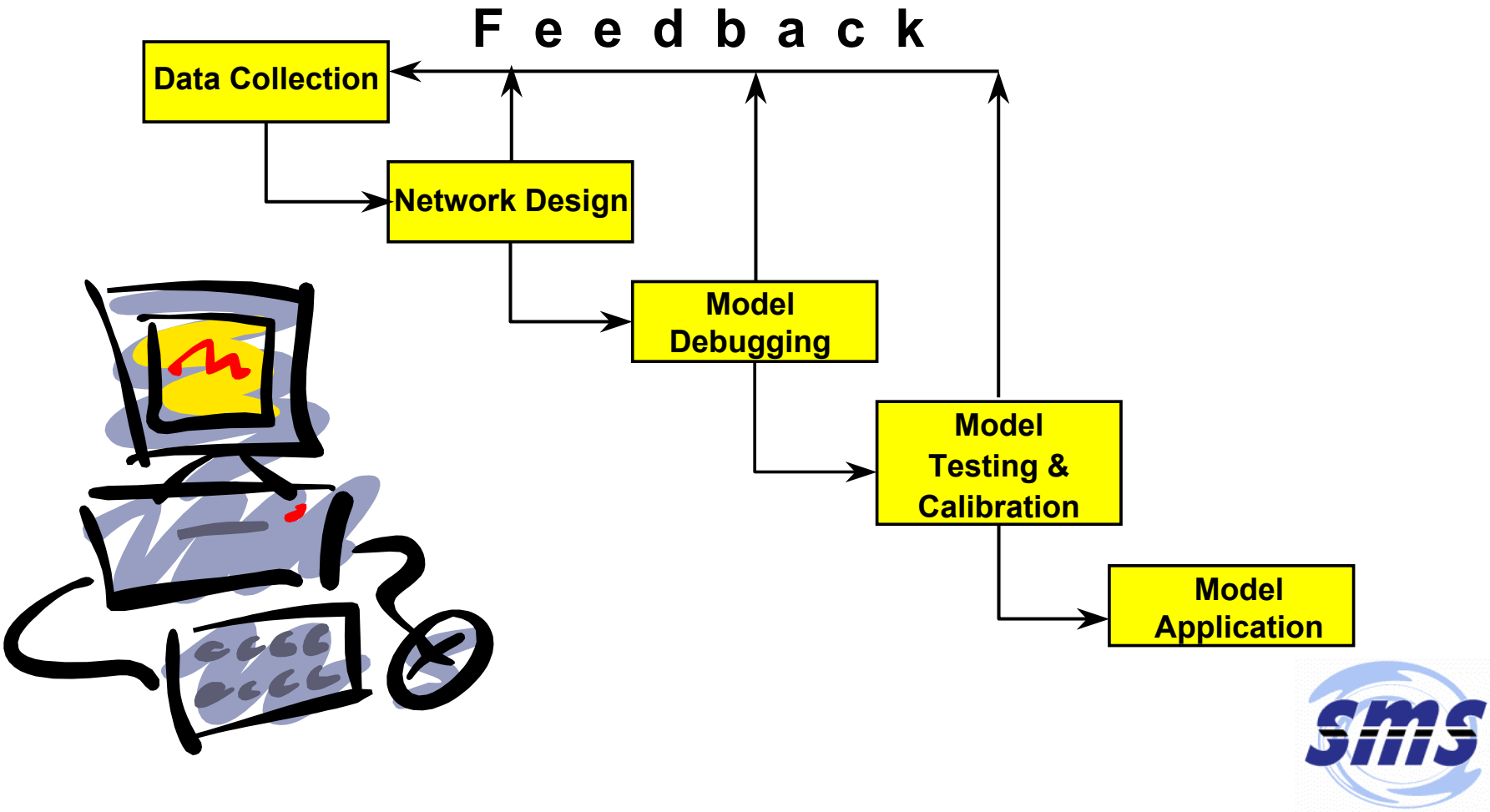
Physical Model



Numerical Modeling



The Modeling Process



Introductory Workshop

- Grid Provided
- Demonstrates:
  - Interface
  - Methodology